California Environmental Protection Agency
Department of Pesticide Regulation
P.O. Box 4015
Sacramento, CA 95812-4015

March 21, 2007

STUDY 240: PROTOCOL FOR MONITORING GROUND WATER IN SECTIONS WITH REPORTED DETECTIONS OUTSIDE EXISTING GROUND WATER PROTECTION AREAS

I. Introduction

The Pesticide Contamination Prevention Act (Food and Agricultural Code [FAC] section 13141 et seq) was enacted in 1985 to prevent further pollution of ground water due to the agricultural use of pesticides. FAC section 13150 requires the formal review of pesticides found in ground water due to agricultural use and requires the director to adopt regulations to modify use of the pesticide if a specific finding allowing continued use is made. Those pesticides are listed in section 6800(a) of Title 3 of the California Code of Regulations.

In May 2004 the Director adopted regulations to identify areas sensitive to movement of pesticides to ground water, denoted ground water protection areas (GWPAs), and to modify the use of pesticides listed in section 6800(a) within GWPAs. GWPAs are based on either of two criteria: (1) detections of a 6800(a)-listed pesticide or a related degradation product in ground water due to legal agricultural use, or (2) the presence of specified soil types, climate, and depth to the ground water that are characteristic of sections where pesticides or their breakdown products have been detected due to legal agricultural use (Troiano et al., 1999). The California Vulnerability Modeling Approach (CALVUL) is used to identify GWPA sections based on the second criteria.

Determination of a GWPA is a further evolution of the previous determination of vulnerable areas, which were called Pesticide Management Zones (PMZs). A PMZ was a section of land established in regulation that contained at least one well with a detection of a pesticide active ingredient or one of its degradation products determined to be due to legal agricultural use. By policy, the detection of a pesticide chemical was determined to be due to legal agricultural use if:

(1) a pesticide active ingredient contained in a currently registered pesticide, or one of its degradation products, was detected in two wells located within the section with a detection or one of the three sections most adjacent to the well in the section with a detection (4-adjacent-section area),
(2) there were sites in the section where the pesticide could have been applied, and
(3) there were no point, non-agricultural use or non-pesticidal sources that could have exclusively accounted for the detection.

PMZs were pesticide-specific. In contrast, GWPAs are based on any combination of detections of a 6800(a)-listed pesticide or its degradation product(s) in at least two wells in a 4-adjacent-section area.

Currently, there are a number of sections outside GWPAs that have reports of detections of 6800(a)-listed pesticide residues or their degradation products ("known contaminants"). This study will provide data to determine if another well within a 4-adjacent section area can be found to contain a known contaminant, facilitating the determination of a GWPA. The previous sampling design treated each section as a unit and the surrounding three most adjacent sections were identified for potential well sampling locations. A number of the current detections are not located within a 4-adjacent-section-area but they are located relatively close to each other (within a few miles -Figure 1). In order to provide a more efficient method by which to link these detections, transects were drawn between nearby wells (Figure 1). Wells will be sampled along the transects so that detections in adjacent sections will provide a direct link with one another, providing evidence for a legal agricultural use determination and subsequent listing as a GWPA.

II. Study Objective

This study has two objectives. The first objective is to use an efficient sampling design to provide detections for determination of whether or not detected pesticide residues are due to legal agricultural use. The sampling design is based on identification of a transect that connects wells containing pesticide residues that are located relatively close to one another. The second objective is to obtain well sampling data on the presence and distribution of pesticide residues in areas outside existing GWPA sections. Soil types, depth-to-water and pesticide use data for these sections will be compared to the presence of pesticide residues in the sampled wells to identify current CALVUL factors that may need to be modified or factors that may need to be incorporated into the CALVUL model.

III. Personnel

Standard project organization and responsibilities are described in SOP ADMN002.01 (Segawa, 2003). This project is under the overall management of Lisa Quagliaroli, Senior Environmental Research Scientist (Supervisor), Environmental Monitoring Branch.

Study personnel from the Environmental Monitoring Branch of DPR include:

Project Leaders:	Craig Nordmark, Matt Fossen
Senior Scientist:	John Troiano
Additional Field Personnel:	Murray Clayton, Joy Dias, Joe Marade, Lisa Quagliaroli, Scientific Aids
Laboratory Liaison:	Carissa Ganapathy
Agency/Public Contact:	Mark Pepple

Questions concerning this monitoring program should be directed to Mark Pepple at (916) 324-4086, email mpepple@cdpr.ca.gov, and FAX (916) 324-4088

IV. Study Design

Study Area: The study area is defined by the location of wells that contain 6800(a)-listed pesticide residues or their breakdown products and that are located outside of existing GWPAs. Transects were drawn between wells that were closely located to each other (Figure 1). Approximately 50 potential transect studies were identified in 18 counties. Illustrations for each county can be found in Attachment 1 (Butte, Colusa, Fresno, and Glenn counties), Attachment 2 (Kern, Kings, Los Angeles, Madera, and Merced counties), and Attachment 3 (Monterey,

Orange, Riverside, Sacramento, San Bernadino, Solano, Stanislaus, Sutter, and Tulare counties). Transects will be prioritized based on the following criteria: 1) the transect will help determine whether the detection(s) was due to legal agricultural use; 2) the transect will provide additional data for updating the CALVUL model in areas where it is currently lacking; and 3) the transect can be combined with other transects for the efficient use of DPR resources. Based on the priority given, some of the transect studies depicted will likely not be performed. Sections are approximately one square mile areas (Davis and Foote, 1966) that are the basis for defining GWPAs and much of the reporting of pesticides used in production agriculture in California. A transect line will be drawn between the section centroids of the known pesticide residue detections. The transect may be extended beyond the sections with the detections in order to increase the data collected for specific soil types. Two wells will be sampled in each section in which the transect line passes through at least 20% of the section. Sections where the transect line passes through less than 20% of the section will have one well sampled and that well should be within 0.5 miles of the transect line. All well samples will be analyzed for residues of atrazine, simazine, diuron, prometon, bromacil, hexazinone, norflurazon and breakdown products DEA, ACET, DACT and demethyl-norflurazon. This is referred to as the "standard triazine screen," even though some of the included pesticides are not triazine compounds.

Well Selection: Wells will be selected based on the DPR Standard Operating Procedure SOP FSWA006 for well selection (Marade, 1998). Crews will attempt to locate the shallowest possible suitable well in each target transect section, with a preference for domestic wells. Preference will also be given to wells not previously tested by DPR for triazine residues. However, if the well contained a previously unverified pesticide residue, it will be given a high priority for sampling. Wells in a transect section sampled for triazines by DPR after 2001 will be considered already sampled for this study. If no wells can be found in a transect section, wells may be sampled from an adjacent section in those tracts that are within one-half mile of the transect line. All available well data will be requested from the owner. Additionally, the depth to water will be taken at the time of sampling, if possible, and the well log for the well will be requested from the Department of Water Resources. See the additional notes in each county's appendix for additional information on the sampling in specific counties.

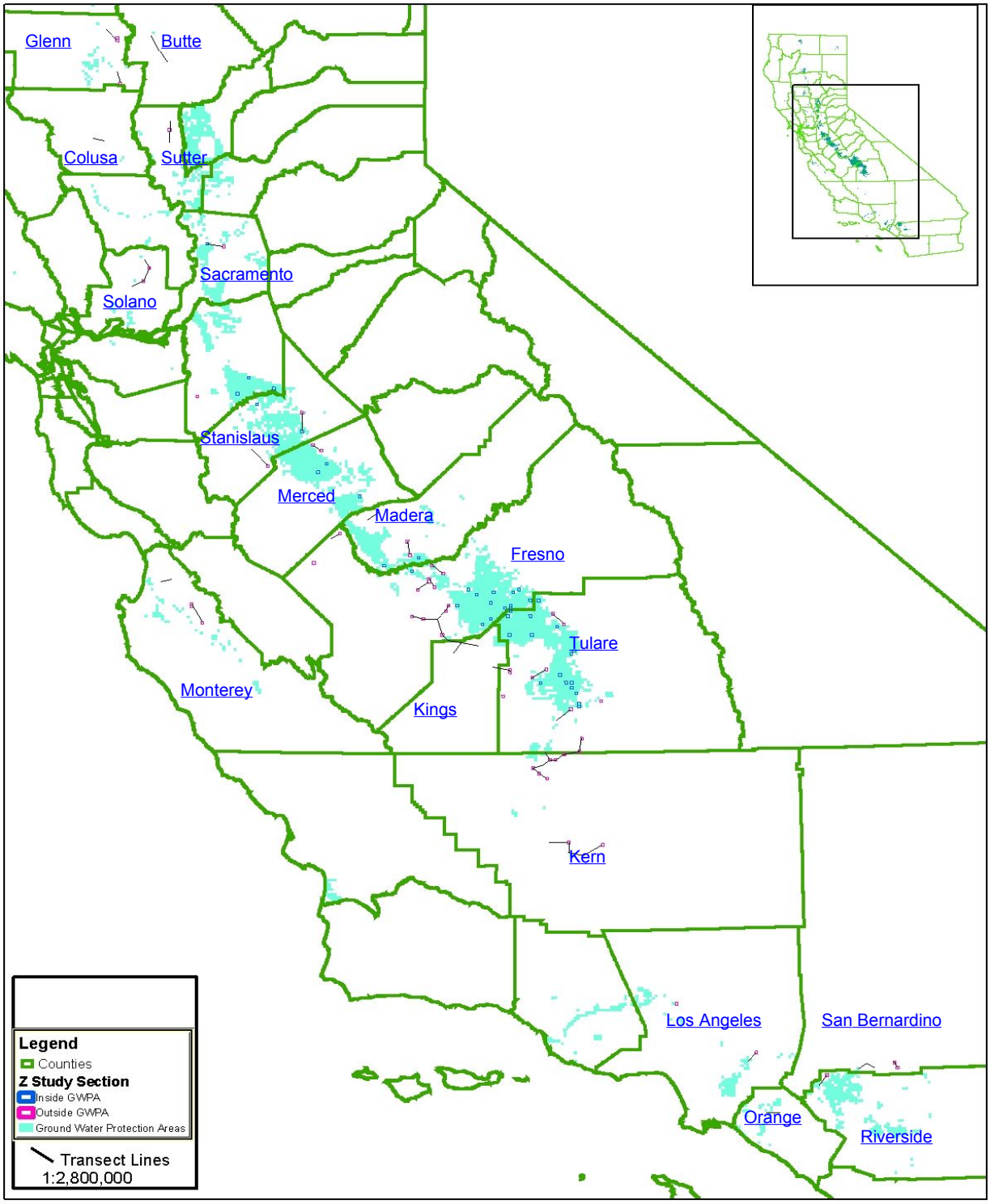
Due to the number of transects requiring investigation and the availability of resources, this study is expected to take up to two years to complete. Data will be continuously evaluated throughout the course of the transect study to ensure efficient use of resources. Certain transects or portions of transects may not need to be tested if study data indicates that the sections could be recommended as GWPAs based on the current policy of detections in a section or a section adjacent to a current GWPA. For instance, well data results from 4-section surveys, ground water protection area studies, or focused areal studies in the transect areas may provide results that can be used to recommend GWPAs. No other work would be required once a section has been determined to be vulnerable to pesticide movement to ground water because that determination is based on the detection of a pesticide.

V. Sampling Method

Well Sampling: Wells will be sampled using the standard DPR well sampling procedures outlined in SOP FSWA001.00 (Marade, 1996). The number of planned wells sampled will vary with the length of the transect and the number of previously sampled wells in the transect section. One primary sample, two backup samples and one field blank will be collected from

each well in one-liter amber bottles. Samples will be stored on wet ice for transport and will be refrigerated until analysis.

Figure 1. Study 240 potential ground water transect areas statewide.



VI. Chemical Analysis and Quality Control

The California Department of Food and Agriculture (CDFA) laboratory has established analytical methods of analysis of atrazine, simazine and the breakdown products DEA, ACET and DACT in well water using LC/MS/MS. Additionally, the pesticides diuron, prometon, bromacil, hexazinone, norflurazon and demethyl-norflurazon are included in the analytical method. The reporting limit for all analytes is 0.05 parts per billion (ppb). Turn-around time from the submission of the initial samples until the return of preliminary results is planned for less than four weeks. If pesticide residues are detected in a primary sample the corresponding field blank will be submitted for analysis unless DPR has previously verified that pesticide residue in that well. Quality control for this analytical method will follow SOP QAQC001.00 for Chemistry Laboratory Quality Control (Segawa 1995).

VII. Timetable

Sampling Schedule: This study will be conducted starting in March 2007 and is expected to be completed by the end of Fiscal Year 2007/2008. The actual sampling dates will be determined by crew availability, transect priorities, and ongoing analysis of current and new data.

VIII. References

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IX. Budget

FY 2006 / 2007

Sampling

Analysis	# of Samples	Cost / Sample	Total Costs
Full TR Screen	130	720	93600
1 QC / Set	15	720	10800
1 Blank / Set		0	0
Blind Spike QC	13	720	9360
Field Blanks	13	720	9360
Total			123120

Personnel & Other Costs

Staff Time	0.3 PY
Per Diem	$6000

FY 2007/2008 – To be determined based on FY 2006/2007 activities and results.